NEW RECORDS OF CENOZOIC AMPHIBIANS AND REPTILES FROM CALIFORNIA

By Bayard H. Brattstrom*

While examining fossil amphibians and reptiles in various museums several specimens were found that add to our knowledge of the herpetofauna of certain paleontological sites in California. This new material comes from Eocene, Miocene, and Pleistocene deposits and represents specimens in the collections of the University of California and the Los Angeles County Museum including the recently acquired collection of the California Institute of Technology. The material will be discussed by age and locality.

EOCENE

Poway Conglomerate

Amyda sp.

From C.I.T. Locality 249, Eocene, Poway Conglomerate, Cliff on West side of San Diego River, approximately ¼ mi. N.E. of the San Diego Mission, San Diego County, California, there are eight fragments of a soft-shelled turtle. The species is unidentifiable due to the fragmentary nature of the material. It is of interest, however, first to record this turtle for the Eocene of California and second to add it to the fauna of the Poway Conglomerate.

Sespe Formation

Amyda sp.

A fragment of a soft-shelled turtle was found in collections made for the University of California by R. H. Tedford from Brea Canyon Site Number 3, (U.C.V. 5242).

Testudo sp.

A fragment of the carapace of a large tortoise from C.I.T. Loc. 180 is mentioned here only to add a tortoise to the fauna of the Eocene of California and to Locality 180. It is unidentifiable as to species.

Saniwa brooksi Brattstrom

Thirteen vertebrae, 10 of which are caudals, come from C. I. T. Loc. 180. They do not differ from *S. brooksi* as described by the writer from the Poway Conglomerate. Measurements made on the

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three thoracic vertebrae include: Centrum ball height and width: 4.7-8.3, 2.7-5.5, 3.3-5.9; measurements on the largest vertebra include: width of vertebra, 10.7; width across prezygapophyses, 15.2; width of process of prezygapophysis, 4.6 mm.

A portion of a maxilla containing one tooth is also included in this material. The fragment measures 10.3 x 8.9 mm. and the tooth is 3.0 mm. high and 3.0 mm. wide. The fragment may be from a *Saniwa*.

Lizard sp.

Additional lizard material from the type locality of *Peltosaurus macrodon* (C.I.T. Loc. 180) includes 12 pieces of body plates and four fragments of jaws with teeth. The teeth in the four bones are not beveled, but elongated and pointed. The material at hand is unidentifiable at present.

Boavus affinis Brattstrom

Some 24 additional vertebrae of this species have been found since its original description. The material comes from the same locality as the Type and Paratypes (C.I.T. Loc. 180 and 202) and from one additional locality (C.I.T. 150). The vertebrae are all similar to the Type with regard to the centrum keel and depression, zygosphene, and the relation of the centrum keel to the ball. In 7 of the vertebrae the centrum keel does not touch the ball, but these vertebrae are somewhat worn and this condition may have resulted from weathering. Ranges of measurements of all known thoracic vertebrae of *Boavus affinis* include: vertebrae height: 13.7-24.9; vertebrae width: 8.5-19.5; centrum length 5.8-14.0; width across prezygapophyses: 13.5-22.1; width acros postzygapophyses: 15.0-20.9; height of neural spine: 5.2-8.7; width of neural spine 6.6-6.8 mm.

MIOCENE

Barstow Syncline

Charina prebottae new species

Type: University of California, Museum of Vertebrate Paleontology, number 45242, consisting of two mid-thoracic vertebrae.

Type locality and age: Upper Miocene, Barstow formation, Barstow Syncline, San Bernardino County, California, collected by R. H. Tedford and R. L. Schultz.

Diagnosis: A *Charina* of the same size as the recent *C. bottae* and differing from it only in the following details: Area between forks on the anterior edge of zygosphene rounded when viewed from above; neural spine very small and forked anteriorly; anterior edge of neural spine descended to the dorsal surface of the zygosphene—not indented laterally.

Description of type: the type consists of two, small, low, mid-thoracic vertebrae. The neural spine is very small in height, width, and length. It is forked anteriorly and the anterior edge descends to the dorsal surface of the zygosphene and is not undercut. The

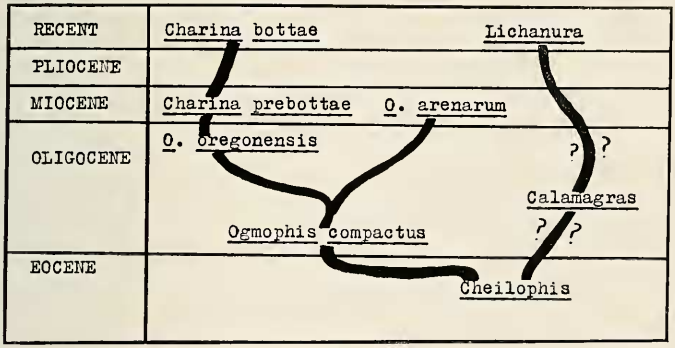

PLATE 3

Diagram showing possible relationships of several North American Cenozoic boids based on similarities of thoracic vertebrae.

zygosphene is flat on top with the lateral edges slightly rounded. The anterior edge of the zygosphene, between the anterior-lateral extensions or forks is slightly curved forward. The subcentrum keel is flat, smooth, and bordered laterally by a weak flat area. The keel does not touch the ball but stops in a point before reaching it. The cup is rounded and slightly slanting ventrally. The prezygapophyses are raised slightly above the horizontal.

Discussion: *Charina prebottae* is most closely related to the Recent *C. bottae,* from which it differs only in details. The anterior edge of the neural spine is not undercut as in *bottae.* The zygosphene in *bottae* has a flat rather than a curved anterior edge. The subcentrum keel of *bottae* usually just touches the ball and is only slightly pointed. The genus *Charina* differs from the fossil genus *Ogmophis* only in a few details. Among members of that genus, *C. bottae* and *prebottae* resemble *O. oregonensis* of the Upper Oligocene, John Day region of Oregon. Unfortunately the type of O. *oregonensis* is lost and the species is known only from the original description and poor figures. *Charina* differs from *O. oregonensis,* however, in having a small, stubby neural spine. *Charina* differs from O. *arenarum* of the Miocene of Montana in that the latter has a transversely ovate cup. *Charina* differs from *O. compactus* of the Oligocene of Canada in having an oblique ball and an interzygapophyseal ridge (absent in *O. compactus,* but presents in *Charina* and the other *Ogmophis*).

The genus *Calamagras* was retained as distinct from *Ogmophis* by Gilmore (1938) primarily on the basis of the sub-centrum keel, long foramen lateral to the keel, and the shape of the neural spine. *Calamagras* vertebrae are similar to *Lichanura* and the two may be related. The ancestor of the genera *Ogmophis* and *Calamagras* is unknown at present. The questionable *Cheilophis* of the Eocene

of Wyoming is similar in basic type to *Calamagras*. Some of these similarities of vertebrae are diagrammatically shown in Plate 3.

PLEISTOCENE

Potter Creek Cave

In 1953, Brattstrom described a new species of rattlesnake from Potter Creek Cave in Shasta County, California. Since then additional herpetological material from this cave has been found in the collections of the University of California. This includes:

Bufo boreas Baird and Girard

Toad material from Potter Creek Cave comes from depths of a few inches to 60 inches and includes entire and fragmentary humeri and tibia-fibulas. The bones are all from large individuals. The humeri are sligthly more robust than Recent *B. boreas* and the ridge at the distal end of the humerus is small or absent. There is some variation in this ridge in skeletons of Recent *B. boreas*.

Clemmys sp.

There are several fragments of *Clemmys* from this cave. The fragments are unidentifiable as to species but probably represent *C. marmorata*.

Crotalus potterensis Brattstrom

This species was described from two vertebrae. Since then some 34 additional *Crotalus* vertebrae have been found in the University of California collection. These vertebrae, unlike the type, have depth data with them. The *Crotalus* vertebrae were found from depths of several inches to 140 inches. Measurements were made on these 34 vertebrae of the various characteres used by Brattstrom (1953b, 1954b). These characters are tabulated by depth in Plate 4. On the basis of the critical characteristics of *C. potterensis* (centrum length, neural spine width, width of postzygapophysis process, width across postzygapophyses) it appears that the vertebrae from the lower (older) levels of the cave (140-80") are more like *C. viridis* than *potterensis*. Vertebrae from intermediate levels (60-40") are intermediate between *viridis* and *potterensis* and the vertebrae from the upper levels (30-4") are potterensis-like. This would suggest that the divergence of *potterensis* from a *viridis* stock is visible within the cave material and that *potterensis* diverged from *viridis* at a time in the past represented by the 40-60 inch level in the deposit. Unfortunately we do not know the rate of deposition of the cave material nor the exact age of the cave. In addition this apparent divergence is based on only a few vertebrae.

Assuming that a rattlesnake of large size can live only in a warm or hot climate (*i.e.* in a cool climate a large rattlesnake

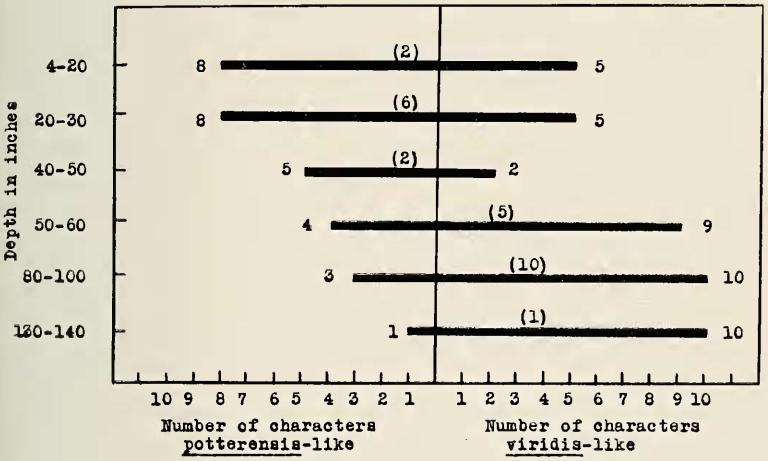

PLATE 4

Graph showing changes in number of characters of *Crotalus* vertebrae in Potter Creek Cave correlated with depth. Number of vertebrae at each level indicated above bar. The characters used are those of measurements as used by Brattstrom, (1953a, 1954b).

could not heat its body to optimum levels) the changes in size of rattlesnakes from small to large within Potter Creek Cave suggests an increase in general environmental temperature in the more recent deposits. Extinction of *potterensis* may be related to the climate becoming too warm or to a subsequent rapid cooling. Unfortunately we do not know the exact age of Potter Creek Cave. It may be just preglacial or postglacial.

Mescal Cave

A collection of fossils from Mescal Cave, Mescal Range, San Bernardino County, California, is in the Museum of Paleontology, University of California. The total fauna of the cave is unreported upon, but the cave deposits are probably of a Late Pleistocene age. According to Keith Murray (personal communication) the mammals from the cave include a marmot, pika, *Citellus lateralis*, a *Microtus*, and probably *Neotoma cinerea*. These mammals suggest a climate cooler than that at the site of the cave today (see Johnson, Bryant, and Miller, 1948). Among the reptiles from the cave deposits, two forms *(Sceloporus occidentalis*—which occurs at the site of the cave today as a probable relic, and *Crotalus viridis*—which does not occur in the Mescal Range today) conform with the mammal data suggesting a cool climate for the deposit. Several of the desert reptiles now living around the fossil site (see Johnson, *et. al. supra cit.*) also occur in the cave

deposits. The latter may be from more recent deposits, but unfortunately no stratigraphic data are available. The herpetofauna of the deposit includes:

Gopherus agassizi (Cooper)

A broken portion of an epiplastron of *G. agassizi* was found in the cave. It measures 55.3 mm. along its outer margin and 36.0 mm. long at the gular sulcus.

Sceloporus occidentalis Baird and Girard

Eleven fragmentary or entire dentaries, one complete lower jaw, and four fragments of maxillae do not differ from recent *Sceloporus occidentalis*. The flat area lateral to the teeth on the dentary, the posterior process of the dentary, the shape of the coronoid, and the flat portion of the maxillae all indicate that these bones are of *S. occidentalis* and do not represent any of the other *Sceloporus* in the southwest (*magister, graciosus, clarki, orcutti*, etc.).

This species occurs at the site of the cave today (Johnson, Bryant, and Miller, 1948) as a population isolated from the main range of the species.

Cnemidophorus cf. *tigris* Baird and Girard

One dentary with 24 teeth sockets has bilobed teeth. The larger lobe is somewhat obtuse and squatty, not elongate and acute as in Recent *C. tigris* skeletons. The teeth are larger than in Recent *C. tigris*. Other Pleistocene *C. tigris* (Brattstrom, 1954a) seem to have these same kinds of characters. Measurements on the dentary include: length: 13.1; width 3.2; distance between posterior tooth and last foramen: 4.3; distance between last two foramen: 1.4 mm.

Crotaphytus sp.

Two separate fragments of large lower jaws are referred to this genus. One, a fragment of a dentary, is unidentifiable other than it resembles the other fragment. The latter has a dentary, coronoid, and parts of the splenial and articular. This jaw is similar in general shape (especially coronoid shape and curvature, and the edges around the post-coronoid foramen) to *Crotaphytus* and especially to *C. (Gambelia) wislizeni*. In certain characters (post-coronoid foramen bordered below by coronoid, low lateral coronoid knob) it resembles *C. (Crotaphytus) collaris*. It differs from both these forms in having the coronoid and articular margin of the posterior dentary process lower on the jaw and extending farther posteriorly, in the presence of a medial coronoid knob or ridge continuing medially and ventrally, and in having a posterior-medial edge on the elevated part of the coronoid. The characters of the coronoid, the most distinctive feature of the fragment, do

not agree with any of the other North American genera of Iguanids. The distinctive features of the fragment are sufficiently diagnostic for recognition of a new species, but due to the small and fragmentary nature of the fossil, description is withheld until further material comes to light.

Crotalus viridis (Rafinesque)

There are 33 vertebrae from this cave that do not differ from modern *Crotalus viridis* in shape or measurements. Many of the vertebrae are connected and connective tissue is still present on some of them.

This locality is outside the present range of *C. viridis,* but its occurrence here is not surprising as the species has been recorded from Gypsum Cave, Nevada (Brattstrom, 1954a) to the northeast. The range of *C. viridis* was probably widespread across much of the present day desert in Pliocene and possibly cool Pleistocene times as suggested by the present distribution of the species and the available fossils (Brattstrom, 1954a, 1954b). With Pleistocene or maybe even post-glacial times the range of the species apparently became restricted away from desert areas. Perhaps certain populations became isolated in several mountains in the developing desert region (Ex. Mescal Range) and became extinct there as desert climates moved up the mountains.

Schuiling Cave

The fauna of Schuiling Cave, approx. 11 mi. S. E. of Daggett, Newberry Mountains, San Bernardino County, California, was reported on by Howard and Downs (San Bernardino Co. Mus. Ass'n Bull, March, 1956). The fauna includes several kinds of ducks, a coot, avocet, extinct condor, Golden eagle, red-tailed hawk, mourning dove, horned owl, flicker, raven, and the following mammals: *Perognathus, Neotoma, Taxidea, Urocyon, Equus* (2 species), large camelid, *Tanupolama,* and *Breameryx.* The only reptiles from this cave are:

Gopherus agassizi (Cooper)

Tortoise material from this cave in the Los Angeles County Museum includes LACM 1996.0—.73 (shell fragments and limbs; various depths), 1997.27 (shell fragments, various depths), 1557 (shell fragment, 48″ deep), and 1553 (partial carapace).

Sauromalus obesus Baird

Chuckwalla material from Schuiling Cave includes three vertebrae from depths of 6′3″ (LACM 1979), 3′6″ (1999), and 40-50″ (3002), and one occipital from 5′8″ (1573). The vertebrae do

not differ from Recent *Sauromalus obesus* in size and shape. The ventral shape of the centrum with its heavy, flattened subcentrum keel bordered laterally by grooves and ridges, gives a triangular appearance to the ventral surface of the vertebrae. The size of the vertebrae and the shape of the subcentrum keel eliminates all southwestern Iguanids except for the chuckwalla. Measurements of two of the vertebrae are: centrum length: 5.8 and 8.6; width across prozygapophyses: 7.9-8.8; width across postzygapophyses: 6.8 and 8.5 mm.

Rancho La Brea

While working as an assistant to Theodore Downs of the Los Angeles County Museum during the Summer of 1956, I had the occasion to move about certain portions of that museum's La Brea collection. In doing this, several additional herpetological specimens from the La Brea tar pits were found. The material is primarily of interest in recording additional pit-data for certain species.

Clemmys marmorata (Baird and Girard)

Many boxes of bones of this pond turtle were found and apparently include portions of some 126 individuals. These turtles come from pits (with the number of individuals in parentheses): 3(8), 4(38), 9(2), 16(48), 36(4), 60(3), 61(6), 67(10), 77(1), 81(1), 0(5). Some of these turtle bones had specific depth data on them. This is presented here for the record. Pit 3/5-8′; 3/F5,8′; Pit 4/F45,12-13′; 4/F45,17-20′; 4/B4,13′; 4/8′; Pit 9/near surface: 9¾2-8′; Pit 16/6-8′; 16/0-2′; Pit 60/C13,13′; Pit 61/D15,14-17½′; Pit 67/C8,17-18′; 67/F10,14½-15½′.

Coluber constrictor Linnaeus

Vertebrae of this species come from pits 37, 36, 10, and 10D. This species was only tentatively referred to by Brattstrom, (1953a).

Lampropeltis getulus (Linnaeus)

Three additional vertebrae of this species come from pits (one each): 10, 28, 37.

Crotalus viridis (Rafinesque)

Additional material of this rattlesnake comes from the following pits: 10, 10D, 28, 31, 36, 37, 67, 81. The one vertebra from pit 31 is quite large for this species.

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FOSSIL ARTHROPODS OF CALIFORNIA. No. 21. TERMITES FROM CALICO MOUNTAINS NODULES.

Drawings by author. Photos by George Brauer.

INTRODUCTION

This is the first of a series of papers that will be presented on the Miocene Lake bed nodules from the Calico Mountains, San Bernardino County, California.

In 1954 I first read newspaper clippings about the finding of fossil insects in lacustrine deposits in the Mojave Desert. On August 6, 1954, Allison R. Palmer and Allen M. Bassett published a brief note on Nonmarine Arthropods from California, in Science, vol. 120, pp. 228, 229. In May 1955 I had the privilege of seeing some of these interesting fossil insects in Dr. Palmer's office in Washington, D.C. His official report on these nodules and the contained insects is in press.

Early in 1956 Mr. and Mrs. John H. Rouse called on me to show some fossil insects in nodules they had found in the Calico Mountains. They were unaware of the earlier findings of Palmer and Bassett. Since then they have made frequent trips to collect nodules. These have also been collected in the Calico Mountains by entomologists from the University of California at Riverside, and by Mr. and Mrs. Sam Kirkby, also of Riverside.